IN THE CLAIMS:

1. (Currently Amended) ~~Method~~A method for estimating a propagation channel in ~~the~~a presence of transmit beamforming, accounting for ~~the~~a structure of two logical channels (CPICH, DPCH) and based on a common structure of corresponding propagation channels, ~~said second~~one (DPCH) of said two logical ~~channel (DPCH)~~ channels comprising two sub-channels (DPDCH, DPCCH), said method includes providing channel estimation in a multipath environment to acquire a beamforming complex factor by modeling said propagation channels ~~being modeled~~ as a linear superposition of a finite number of discrete multipath components (p=1,..., *P)* following an uncorrelated-scattering wide-sense stationary model, and wherein a multipath component ~~being~~is characterized by a time-varying multipath complex coefficient $(c_p(t) and\ \beta_p c_p\ (t)\ )$ and a delay (τ_p).

2. (Currently Amended) ~~A~~The method for estimating a propagation channel in the presence of transmit beamforming as claimed in claim 1, characterized in that said propagation channel correspond to the first sub-channel (DPDCH) and that said method provides estimates of each multipath component (p=1,..., *P)* complex coefficient $(\beta_p c_p\ (t)\ )$ according to a maximum-a-posteriori MAP optimization criterion accounting for the whole available information associated with said logical (CPICH, DPCH) and corresponding propagation channels, through the following processing steps of:

1. building a second channel comprising (DPCH) and a first channel comprising (CPICH) having instantaneous maximum likelihood (ML) channel multipath complex coefficients estimates $(\hat{c}_{dpch}(n), \text{and } \hat{c}_{pich}(n))$,
2. performing interpolation of the above obtained ML instantaneous second (DPCH) and first (CPICH) channel multipath complex coefficient estimates $(\hat{c}_{dpch}(n), \text{and } \hat{c}_{pich}(n))$ to ~~the~~a lowest symbol rate of said second (DPCH) and first(CPICH) logical channels,

3. computing an optimal linear prediction filter (**f**) according to a joint second and first channels (DPCH-CPICH) maximum-a-posteriori (MAP) criterion,
4. filtering the interpolated ML instantaneous second (DPCH) and first (CPICH) channel multipath complex coefficient estimates obtained at step 2 with said optimal linear prediction filter in order to obtain a MAP first sub-channel (DPDCH) multipath coefficient estimate ($\check{c}_{dpch\text{-}MAP}$ (k)), and
5. interpolating said MAP first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{dpch\text{-}MAP}$ (k)) to the second logical channel (DPCH) symbol rate when

   said symbol rate is lower than the first logical channel (CPICH) symbol rate,

where steps 1 to 5 are repeated for all multipath component *(p=1,. .,P)* complex coefficients ($\beta_p c_p(t)$).

3. (Currently Amended) A ~~second~~ method for estimating a propagation channel in ~~the~~a presence of transmit beamforming characterized in that said propagation channel corresponds to ~~the~~a first sub-channel (DPDCH) and that said method provides estimates of each multipath component *(p=1...,P)* complex coefficient, accounting for the whole available information associated with ~~said~~ two logical channels (CPICH, DPCH) and corresponding propagation channels, through the following processing steps of:

1. building a second channel comprising (DPCH) and a first channel comprising (CPICH) having instantaneous maximum likelihood (ML) channel multipath coefficients estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{pich}(n)$),
2. performing interpolation of said ML instantaneous first (DPCH) and second (CPICH) channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$) to the lowest symbol rate of said second (DPCH) and first (CPICH) logical channels,
3. building an optimal maximum a posteriori estimate ($\check{c}_{cpich\text{-}MAP}$ (k)) of the first (CPICH) channel multipath coefficient ($\tilde{c}_{cpich}$ (k)),
4. building an estimate of ~~the~~a cross-correlation ($\hat{\phi}_{dc}(l)$) between the first (CPICH) and second (DPCH) channel multipath coefficient instantaneous

maximum likelihood estimates obtained at step 2 ($\hat{c}_{dpch}$ and $\hat{c}_{pich}$) and an estimate of ~~the~~an autocorrelation ($\hat{\phi}_{dc}(l)$) between the (CPICH) channel multipath coefficient instantaneous maximum likelihood estimates ($\hat{c}_{pich}$) of step 1 and 2 at non-zerocorrelation lag ($l \neq 0$) for noise suppression,

5. building an estimate ($\hat{\beta}$) of a beamforming complex factor (β) said-correlation and autocorrelation estimates,

6. building a first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{cpich}(k)$) as ~~the~~a product of the estimates obtained at steps 3 ($\tilde{c}_{cpich\text{-}MAP}$ (k))and 5 ($\hat{\beta}$),. and

7. interpolating said first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{cpich}(k)$) to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate,

where steps 1 to 7 are repeated for all multipath component $(p = 1,\dots,P)$ complex coefficients ($\beta_p c_p$ (t)).

4. (Currently Amended) ~~A~~The method as claimed in claims 2 and 3, characterized in that the first logical channel (CPICH) maximum likelihood channel multipath coefficient estimates ($\hat{c}_{pich}(n)$)are computed based on the a-priori knowledge of some pilot symbols forming said first logical channel (CPICH).

5. (Currently Amended) ~~A~~The method as claimed in claims 2 and 3, characterized in that the second logical channel (DPCH) maximum likelihood channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$, related to the second sub-channel (DPCCH) are computed based on the a-priori knowledge of the pilot symbols forming said second sub-channel (DPCCH).

6. (Currently Amended) ~~A~~The method as claimed in claims 2 and 3, characterized in that the second logical channel (DPCH) maximum likelihood channel multipath coefficient estimates ($\hat{c}_{dpch}$(n)) related to the first sub-channel (DPDCH) are computed by a decision-direct mechanism.

7. (Currently Amended) ~~A~~The method as claimed in claims 2 and 3, characterized in that the interpolation of step 2 is performed by nearest neighbor interpolation.

8. (Currently Amended) ~~A~~The method as claimed in claim 2, characterized in that the optimal linear prediction filter is built according to the maximum-a-posteriori optimization criterion, based on the interpolated maximum likelihood channel multipath coefficients estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{pich}(n)$) related to said first (CPICH) and second (DPCH) logical channels in order to
provide an optimal by joint second and first channel (DPCH-CPICH) maximum-a-posteriori first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{dpch-MAP}$ (k)).

9. (Currently Amended) ~~A~~The method as claimed in claim 3, characterized in that a maximum likelihood estimate of the second (DPCH) corresponding propagation channel and first (CPICH) corresponding propagation channel cross-correlation (E{$\hat{c}_{dpch}(n)$ $\hat{c}^{*}_{pich}(n-l)$}) and a maximum likelihood estimate of the first (CPICH) corresponding propagation channel autocorrelation (E{$\hat{c}_{dpch}(n)$ and ($\hat{c}^{*}_{pich}(n-l)$}are computed based on the sample moments (($\hat{\phi}_{dc}(l)$) and ($\hat{\phi}_{cc}(l)$) of the first (CPICH) and second (DPCH) channel maximum likelihood estimates ($\hat{c}_{dpch}(n)$, and $\hat{c}_{pich}(n)$)of ~~step~~steps 1 and 2.

10. (Currently Amended) ~~A~~The method as claimed in claim 3, for the computation of the estimate of said complex beamforming factor (β) characterized in that the second logical channel (DPCH) and the first logical channel (CPICH) corresponding propagation channel cross-correlation and the first logical channel (CPICH) corresponding propagation channel autocorrelation maximum likelihood estimates (($\hat{\phi}_{dc}(l)$) and ($\hat{\phi}_{cc}(l)$) at different correlation lags $(l = 1,$ 2,...,L) are linearly combined **($\sum_{l=1}^{L} a_l \hat{\phi}_{dc}(l)$ and $\sum_{l=1}^{L} b_l \hat{\phi}_{cc}(l)$).**

11. (Currently Amended) ~~A~~The method as claimed in claim 3, characterized in that the second logical channel (DPCH) and first logical channel (CPICH) cross-

correlation and the first logical channel (CPICH) autocorrelation successive estimates (($\hat{\phi}_{dc}(l)$) and ($\hat{\phi}_{cc}(l)$)) are taken at a fixed lag (l) and are low-pass filtered for the computation of the estimate of said complex factor (β).

12. (Currently Amended) ~~A~~The method as claimed in claim 3, characterized in that the estimate of said complex factor (β) is built as a linear combination of the beamforming complex factor estimates computed as the ratio of the second logical channel (DPCH) and the first logical channel (CPICH) corresponding propagation channels cross-correlation and the first logical channel (CPICH) corresponding propagation channel autocorrelation estimates at a (

certain lag (l) ($\hat{\beta}_{ML}(l) = \hat{\phi}_{dc}(l) / \hat{\phi}_{cc}(l)$), ($\hat{\beta} = \sum_{l=1}^{K} \gamma_l \hat{\beta}_{ML}(l)$) at lag $l = 1,2,\ldots,K$.

13. (Currently Amended) ~~A~~The method as claimed in any one of claims 10, 11 or 12, characterized in that the estimate of said complex factor (β) is limited to the lag equal to 1.

14. (Currently Amended) A receiver utilizing said methods as claimed in any one of claims 1, 2 or 3.

15. (Currently Amended) An Estimator for estimating a propagation channel in ~~the~~a presence of transmit beamforming~~,~~ by accounting for ~~the~~a structure of two logical channels referred as to a common channel and a dedicated physical channel (CPICH, DPCH), and based on a common structure of corresponding propagation channels, said dedicated physical channel (DPCH) comprising two sub-channels (DPDCH, DPCCH), siad method includes providing channel estimation in a multipath environment to acquire a beamforming complex factor by modeling said propagation channels ~~being modeled~~ as a linear superposition of a finite number $(p=1,..,P)$ of discrete multipath components following an uncorrelated-scattering wide-sense stationary model, and wherein a multipath component ~~being~~is characterized by a time-varying multipath complex coefficient $(c_p(t)$ and $\beta_p c_p, (t))$ and a delay (τ_p).

16. (Currently Amended) ~~An~~The estimator as claimed in claim 15 for estimating ~~a~~the propagation channel in the presence of transmit beamforming, characterized in that said propagation channel corresponds to ~~the~~a first sub-channel (DPDCH) estimation and that said estimator comprises:

- Means to build a second logical channel comprising a (DPCH) channel and a first ~~(CPICH)~~ logical channel comprising a (CPICH) channel for corresponding propagation channel instantaneous maximum likelihood ML channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$),
- Means to perform interpolation of the above obtained (ML) instantaneous second (DPCH) and first (CPICH) logical channel corresponding propagation channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$) to ~~the~~a lowest symbol rate of said second (DPCH) and first (CPICH) logical channels,
- Means to build an optimal linear prediction filter according to a joint second and first (DPCH-CPICH) channel maximum-a-posteriori criterion,

  Means to build a first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{dpch\text{-}MAP}$ (k)) by filtering with said optimal linear prediction filter with said interpolated ML instantaneous second (DPCH) and first (CPICH) logical channel 25 corresponding propagation channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$),obtained at step 2, and
- Means to interpolate said first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{dpch\text{-}MAP}$ (k)) to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate.

17. (Currently Amended) ~~An~~The estimator as claimed in claim 15 for estimating ~~a~~the propagation channel in the presence of transmit beamforming, characterized in that said propagation channel corresponds to the first-sub-channel (DPDCH) and that said estimator comprises:

Means to build a second logical channel comprising a (DPCH) channel and a first

logical channel comprising a (CPICH) logical channel for corresponding propagation channel instantaneous maximum likelihood ML channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$),

Means to perform interpolation of the above obtained ML instantaneous second (DPCH) and first (CPICH) logical channel corresponding propagation channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$) to ~~the~~a lowest symbol rate of said second (DPCH) and first (CPICH) logical channels,

Means to build an optimal maximum a posteriori estimate ($\tilde{c}_{cpich\text{-}MAP}$ (k)) of the first logical channel (CPICH) multipath coefficient (c_{cpich} (k)),

Means to build an estimate ($\hat{\phi}_{dc}(l)$) of ~~the~~a cross-correlation (E{$\hat{c}'_{dpch}(n)$ and ($\hat{c}^{*}_{cpich}(n-l)$}) between the first (CPICH) and second (DPCH) logical channel corresponding propagation channel multipath coefficient instantaneous maximum likelihood estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$) and an estimate ($\hat{\phi}_{cc}(l)$)) of ~~the~~an autocorrelation (E{$\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n-l)$}) between the first logical channel (CPICH) corresponding propagation channel multipath coefficient instantaneous maximum likelihood estimates ($\hat{c}_{dpch}(n)$, of ~~step~~steps 1 and 2 of claim 3, at non-zero correlation lag ($l \neq 0$) for noise suppression,

Means to estimate a beamforming complex factor (β) from said cross-correlation and the auto correlation estimates (($\hat{\phi}_{dc}(l)$) and ($\hat{\phi}_{cc}(l)$),

Means to build a first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{cpich}$ (k))as ~~the~~a product of the optimal maximum a posteriori estimate ($\tilde{c}_{cpich\text{-}MAP}$ (k)) of the first channel (CPICH) multipath coefficient and the cross-correlation and the auto correlation estimates (($\hat{\phi}_{dc}(l)$) and ($\hat{\phi}_{cc}(l)$) ,

Means to interpolate said first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{cpich\text{-}MAP}$ (k)) to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate.

18. (Currently Amended) A receiver comprising ~~an~~the estimator as claimed in claim 15.

19. (Currently Amended) A communication system using athe method for estimating a propagation channel in the presence of transmit beamforming as claimed in claim 1, when information data are transmitted through a beamforming system.